

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION
(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 03 June 1999 (03.06.99)	
International application No. PCT/AU98/00855	Applicant's or agent's file reference 2112340/MLA
International filing date (day/month/year) 14 October 1998 (14.10.98)	Priority date (day/month/year) 14 October 1997 (14.10.97)
Applicant KIRBY, Andrew, Francis et al	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

14 May 1999 (14.05.99)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Lazar Joseph Panakal Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

Date of mailing (day/month/year) 22 April 1999 (22.04.99)	To:
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ANGLISS, Michael, L.
Davies Collison Cave
1 Little Collins Street
Melbourne, VIC 3000
AUSTRALIE

Applicant's or agent's file reference 2112340/MLA	IMPORTANT NOTIFICATION
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International application No. PCT/AU98/00855	International filing date (day/month/year) 14 October 1998 (14.10.98)
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1. The following indications appeared on record concerning:

the applicant the inventor the agent the common representative

Name and Address ORICA AUSTRALIA PTY LTD 1 Nicholson Street Melbourne, VIC 3000 Australia	State of Nationality AU	State of Residence AU
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2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

the person the name the address the nationality the residence

Name and Address HUNTSMAN SURFACTANTS TECHNOLOGY CORPORATION 500 Huntsman Way Salt Lake City, UT 84108-1235 United States of America	State of Nationality US	State of Residence US
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3. Further observations, if necessary:

A Power of Attorney executed by the new applicant is required.

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input checked="" type="checkbox"/> the designated Offices concerned
<input checked="" type="checkbox"/> the International Searching Authority	<input type="checkbox"/> the elected Offices concerned
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer
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Dominique DELMAS

Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION

REC'D 14 FEB 2000

REPORT PCT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2112340/MJC/RR	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International application No. PCT/AU 98/00855	International filing date (<i>day/month/year</i>) 14 October 1998	Priority Date (<i>day/month/year</i>) 14 October 1997
International Patent Classification (IPC) or national classification and IPC Int. Cl.⁷ A01N 25/30; B01F 17/52		
Applicant HUNTSMAN SURFACTANTS TECHNOLOGY CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 38 sheet(s). IB

3. This report contains indications relating to the following items:

I	<input checked="" type="checkbox"/> Basis of the report
II	<input type="checkbox"/> Priority
III	<input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/> Lack of unity of invention
V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/> Certain documents cited
VII	<input type="checkbox"/> Certain defects in the international application
VIII	<input checked="" type="checkbox"/> Certain observations on the international application

Date of submission of the demand 14 May 1999	Date of completion of the report 1 February 2000
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer GAYE HOROBIN Telephone No. (02) 6283 2069

I. Basis of the report

1. With regard to the elements of the international application:*

- the international application as originally filed.
- the description, pages 1-11, 13, 19-28, 30, 31, 34-41, as originally filed,
pages , filed with the demand,
pages 12, 14-18, 29, 32, 33, filed with the letter of 2 September 1999 .
- the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages 42-70 , filed with the letter of 2 September 1999.
- the drawings, pages , as originally filed,
pages , filed with the demand,
pages , filed with the letter of .
- the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , filed with the letter of .

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. The amendments have resulted in the cancellation of:

- the description, pages
- the claims, Nos.
- the drawings, sheets/fig.

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be nonobvious), or to be industrially applicable have not been examined in respect of:

- the entire international application,
 claims Nos.: **15, 25, 46 and 63**

because:

- the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

- the description, claims or drawings (*indicate particular elements below*) or said claims Nos. **15, 25, 46, 63** are so unclear that no meaningful opinion could be formed (*specify*):

In claims 15, 25, 46 and 61, Formula I "R₃" has not been defined, nor has it been defined in the corresponding sections of the description. These claims are thus too imprecise for any meaningful opinion to be formed.

- the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

- no international search report has been established for said claim Nos. **15, 25, 46, 63**

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- the written form has not been furnished or does not comply with the standard.
 the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-4,6-17,21-23,27-33,35,36,38,39,42-45,50-54,57-62,64	YES
	Claims 5,18-20,24,26,34,37,40,41,47-49,55,56	NO
Inventive step (IS)	Claims 1-4,6-17,21-23,27-33,35,36,38,39,42-45,50-54,57,62,64	YES
	Claims 5,18-20,24,26,34,37,40,41,47-49,55,56	NO
Industrial applicability (IA)	Claims 1-14,16-24,26-45,47-62,64	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

NOVELTY(N) Claims 5,18-20,24,26,34,37,40,41,47-49,55,56

- D1 Patent Abstracts of Japan JP 58-131903
 D2 Derwent Abstract Accession No.87-084153/12 of JP 62-036302
 D3 FR 2545325

D1 discloses a granular agricultural chemical composition comprising a water soluble salt of a sulfonated mono-olefin-ethylenic unsaturated dicarboxylic acid copolymer resin. The abstract discloses specifically a sulfonated styrene-maleic anhydride copolymer resin and a sulfonated isobutylene maleic anhydride copolymer resin. The composition is prepared in the form of wettable granules. Claims 18, 19, 20, 24, 26, 34, 37, 40, 41, 5, 47, 48, 49, 55 and 56 are not novel when compared to this document.

D2 discloses granular wettable agricultural compositions containing a polycarboxylic acid type surfactant. The surfactants include copolymers of maleic acid and diisobutylene. This copolymer clearly falls within those defined in claim 5 and it is common knowledge that the agricultural composition would be applied to a substrate when it is used. Claim 5 therefore lacks novelty when compared with this document.

D3 discloses a granular composition of agriculturally active compounds, such as insecticides, acaricides, fungicides, herbicides and repellents, containing a copolymeric dispersant. This dispersant is a copolymer of maleic anhydride and diisobutylene. This copolymer clearly falls within the scope of those defined in claim 5. It is further disclosed that the granules are mixed with water to form a dispersion which is applied to an agricultural substrate. Claim 5 lacks novelty when compared to this disclosure.

INVENTIVE STEP(IS) Claims 5,18-20,24,26,34,37,40,41,47-49,55,56

As above

New Citations

Derwent Abstract Accession No. 87-084153/12, Class A97, C03, JP 62-036302 A (KUMIAI CHEM IND KK)
 17 February 1987
 FR 2545325 A (SEDAGRI) 9 November 1984

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The description lacks clarity because the moiety "R₃" in Formula I at page 14 has not been identified.

Claims 15, 25, 46 and 63 lack clarity because the moiety "R₃" in formula I has not been defined. These issues were raised in Box III of the first opinion but have not yet been addressed.

Claim 1 lacks clarity in that it refers to β-pipene when the rest of the document refers to β-pinene.

Claim 1 lacks clarity in that it refers to methylene cyclopentene when the rest of the document refers to methylene cyclopentane.

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

FEB 2000

PCT

**NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY EXAMINATION
REPORT**

(PCT Rule 71.1) MJC

Date of mailing
day/month/year

03 FEB 2000

Applicant's or agent's file reference 2112340/MJC/RR		IMPORTANT NOTIFICATION	
International application No. PCT/AU 98/00855	International filing date 14 October 1998	Priority date 14 October 1997	
<p>Applicant HUNTSMAN SURFACTANTS TECHNOLOGY CORPORATION</p>			

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translations to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide

Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer GAYE HOROBIN Telephone No. (02) 6283 2069
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PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2112340/MJC/RR	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International application No. PCT/AU 98/00855	International filing date (<i>day/month/year</i>) 14 October 1998	Priority Date (<i>day/month/year</i>) 14 October 1997
International Patent Classification (IPC) or national classification and IPC Int. Cl.⁷ A01N 25/30; B01F 17/52		
Applicant HUNTSMAN SURFACTANTS TECHNOLOGY CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 5 sheets, including this cover sheet. <input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of 35 sheet(s).																	
3. This report contains indications relating to the following items: <table style="margin-left: 20px; border-collapse: collapse;"> <tr> <td>I</td> <td><input checked="" type="checkbox"/> Basis of the report</td> </tr> <tr> <td>II</td> <td><input type="checkbox"/> Priority</td> </tr> <tr> <td>III</td> <td><input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td>IV</td> <td><input type="checkbox"/> Lack of unity of invention</td> </tr> <tr> <td>V</td> <td><input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td>VI</td> <td><input type="checkbox"/> Certain documents cited</td> </tr> <tr> <td>VII</td> <td><input type="checkbox"/> Certain defects in the international application</td> </tr> <tr> <td>VIII</td> <td><input checked="" type="checkbox"/> Certain observations on the international application</td> </tr> </table>		I	<input checked="" type="checkbox"/> Basis of the report	II	<input type="checkbox"/> Priority	III	<input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	IV	<input type="checkbox"/> Lack of unity of invention	V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	VI	<input type="checkbox"/> Certain documents cited	VII	<input type="checkbox"/> Certain defects in the international application	VIII	<input checked="" type="checkbox"/> Certain observations on the international application
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Date of submission of the demand 14 May 1999	Date of completion of the report 1 February 2000
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer GAYE HOROBIN Telephone No. (02) 6283 2069

I. Basis of the report

1. With regard to the **elements** of the international application:*
- the international application as originally filed.
 - the description, pages 1-11, 13, 19-28, 30, 31, 34-41, as originally filed, pages , filed with the demand, pages 12, 14-18, 29, 32, 33, filed with the letter of 2 September 1999 .
 - the claims, pages , as originally filed, pages , as amended (together with any statement) under Article 19, pages , filed with the demand, pages 42-70 , filed with the letter of 2 September 1999.
 - the drawings, pages , as originally filed, pages , filed with the demand, pages , filed with the letter of .
 - the sequence listing part of the description: pages , as originally filed
pages , filed with the demand
pages , filed with the letter of .
2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:
- the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
 - the language of publication of the international application (under Rule 48.3(b)).
 - the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, was on the basis of the sequence listing:
- contained in the international application in written form.
 - filed together with the international application in computer readable form.
 - furnished subsequently to this Authority in written form.
 - furnished subsequently to this Authority in computer readable form.
 - The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
4. The amendments have resulted in the cancellation of:
- the description, pages
 - the claims, Nos.
 - the drawings, sheets/fig.
5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).
** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be nonobvious), or to be industrially applicable have not been examined in respect of:

- the entire international application,
 claims Nos.: **15, 25, 46 and 63**

because:

- the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

- the description, claims or drawings (*indicate particular elements below*) or said claims Nos. **15, 25, 46, 63** are so unclear that no meaningful opinion could be formed (*specify*):

In claims 15, 25, 46 and 61, Formula I "R₃" has not been defined, nor has it been defined in the corresponding sections of the description. These claims are thus too imprecise for any meaningful opinion to be formed.

- the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

- no international search report has been established for said claim Nos. **15, 25, 46, 63**

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- the written form has not been furnished or does not comply with the standard.
 the computer readable form has not been furnished or does not comply with the standard.

V.	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1.	Statement		
	Novelty (N)	Claims 1-4,6-17,21-23,27-33,35,36,38,39,42-45,50-54,57-62,64	YES
		Claims 5,18-20,24,26,34,37,40,41,47-49,55,56	NO
	Inventive step (IS)	Claims 1-4,6-17,21-23,27-33,35,36,38,39,42-45,50-54,57,62,64	YES
		Claims 5,18-20,24,26,34,37,40,41,47-49,55,56	NO
	Industrial applicability (IA)	Claims 1-14,16-24,26-45,47-62,64	YES
		Claims	NO

2. Citations and explanations (Rule 70.7)**NOVELTY(N) Claims 5,18-20,24,26,34,37,40,41,47-49,55,56**

- D1 Patent Abstracts of Japan JP 58-131903
 D2 Derwent Abstract Accession No.87-084153/12 of JP 62-036302
 D3 FR 2545325

D1 discloses a granular agricultural chemical composition comprising a water soluble salt of a sulfonated mono-olefin-ethylenic unsaturated dicarboxylic acid copolymer resin. The abstract discloses specifically a sulfonated styrene-maleic anhydride copolymer resin and a sulfonated isobutylene maleic anhydride copolymer resin. The composition is prepared in the form of wettable granules. Claims 18, 19, 20, 24, 26, 34, 37, 40, 41, 5, 47, 48, 49, 55 and 56 are not novel when compared to this document.

D2 discloses granular wettable agricultural compositions containing a polycarboxylic acid type surfactant. The surfactants include copolymers of maleic acid and diisobutylene. This copolymer clearly falls within those defined in claim 5 and it is common knowledge that the agricultural composition would be applied to a substrate when it is used. Claim 5 therefore lacks novelty when compared with this document.

D3 discloses a granular composition of agriculturally active compounds, such as insecticides, acaricides, fungicides, herbicides and repellents, containing a copolymeric dispersant. This dispersant is a copolymer of maleic anhydride and diisobutylene. This copolymer clearly falls within the scope of those defined in claim 5. It is further disclosed that the granules are mixed with water to form a dispersion which is applied to an agricultural substrate. Claim 5 lacks novelty when compared to this disclosure.

INVENTIVE STEP(IS) Claims 5,18-20,24,26,34,37,40,41,47-49,55,56

As above

New Citations

Derwent Abstract Accession No. 87-084153/12, Class A97, C03, JP 62-036302 A (KUMIAI CHEM IND KK)
 17 February 1987
 FR 2545325 A (SEDAGRI) 9 November 1984

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The description lacks clarity because the moiety "R₃" in Formula I at page 14 has not been identified.

Claims 15, 25, 46 and 63 lack clarity because the moiety "R₃" in formula I has not been defined. These issues were raised in Box III of the first opinion but have not yet been addressed.

Claim 1 lacks clarity in that it refers to β-pipene when the rest of the document refers to β-pinene.

Claim 1 lacks clarity in that it refers to methylene cyclopentene when the rest of the document refers to methylene cyclopentane.

REPLACED BY
ART 32 ANDT

- 12 -

invention include fumaric acid, maleic acid and anhydrides, and the esters, amides and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids, esters and amides, vinylphosphonic acid and the corresponding esters and amides derived from it and ethylene sulphonic acid and 5 the esters and amides derived from it.

The second comonomer for use in the present invention is an olefin having at least one polymerizable double bond which may be substituted as defined herein.

10 The second comonomer for use in the second embodiment of the present invention may be an alicyclic monomer having a polymerizable exo-cyclic double bond. It will be understood that by alicyclic monomer is meant an aliphatic cyclic monomer containing moieties such as a cyclic alkyl, cyclic alkenyl or heterocyclic groups and which may comprise one or more carbocyclic or heterocyclic rings. It will be understood that by exo-cyclic is meant an 15 alkylidene substituted cyclic structure. Alicyclic monomers having a polymerizable exo-cyclic double bond may optionally be substituted. Alicyclic monomers having a polymerizable exo-cyclic double bond of the present invention may include, for example, β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane. The most preferred alicyclic monomer having a polymerizable exo-cyclic double bond.

20

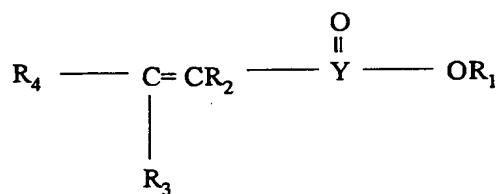
The second comonomer for use in the second embodiment of the present invention may be an alicyclic monomer having a polymerizable endo-cyclic double bond. The term alicyclic

-14-

allyglycidylether of vinylisobutylether. The second comonomer may also be an internal olefin.

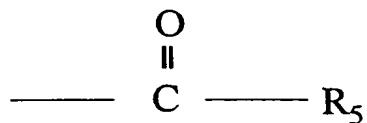
Preferred examples of the first comonomer may be described as having structure I

5



I

wherein R₁ is M a metal, quaternary ammonium, phosphonium or sulphonium residue, R₂ is hydrogen or C₁ to C₄ alkyl is a carbon atom, Y is a carbon O=S, or POR₁ a hydrogen atom 10 or alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R₄ is H, an alkyl radical or a carboxylic acid derivative of form II

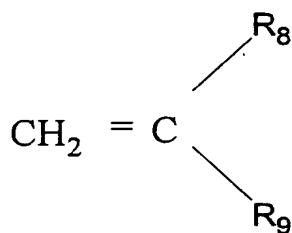


II

15 wherein R₅ is OR₆, NR₆R₇, SR₆,

- 15 -

wherein R₆, R₇, are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent. The second comonomer may be alternatively described as a residue having formula III



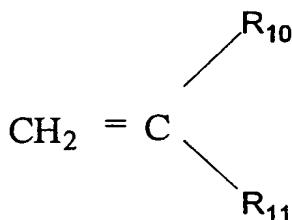
5

III

wherein R₈ represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R₉ represents hydrogen, a branched chain alkyl radical from 1-12 carbon atoms, or cycloalkyl radical,

and/or a vinyl compound of formula IV

10

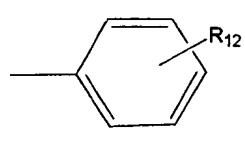


IV

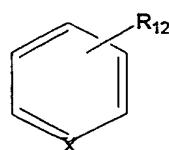
- 16 -

wherein R_{10} is a straight or branched chain alkyl radical of from 1-4 carbons and R_{11} is given by formula V, VI or VII,

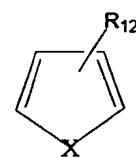
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V

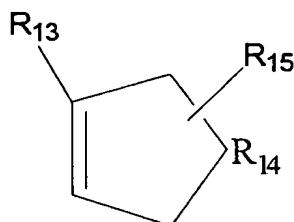


VI



VII

wherein R_{12} represents one or more alkyl radicals or one or more of H, Cl, OR and SO_3R_1 NO_2 , PO_3R_1 and X is a hetero atom other than carbon; and/or an olefin shown by formula
10 VIII,



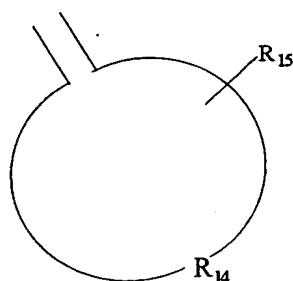
VIII

wherein R_{13} is Cl , or SO_3R_1 , alkyl, O-alkyl, O-aryl and R_{14} , represents from 4-20 carbon

- 17 -

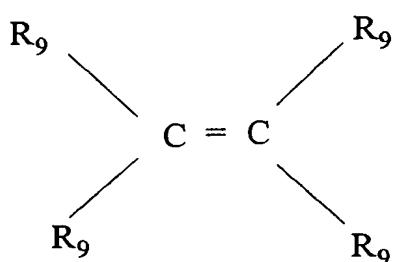
atoms such as to make H a cyclic or polycyclic alkane or polyalkenyl compound, R₁₅, is an epoxide or SO₃R₁ reacted with an unsaturated portion of the ring comprising R₁₄; and/or an exocyclic olefin shown by formula IX

5



IX

and/or an internal olefin shown by formula X,



X

where R₉ is the same or different and as hereinabove defined.

- 5 The dispersant copolymers of the present invention may also include copolymers being the water soluble derivatives of a combination of an unsaturated α,β-unsaturated oxyacid or anhydride and another olefinic monomer, not limited to being of an alternating structure, that may have been derivatised post copolymerisation such as to provide the necessary substituents which may enhance water solubility and regularity of charge or polarity on the polymer.
- 10 Such derivatisation includes that obtained from reaction of groups pendant to the copolymer such as acids and acid derivatives with nucleophilic reagents such as alcohols, amines and thiols to give esters, amides and thioesters respectively.

In a further form of derivatisation copolymers with residual reactive unsaturation may be reacted with electrophilic or radical reagents such as peroxides or sulphite to give epoxides and sulphonates respectively.

In a special case of the above, copolymers with pendant aryl or heteroaryl groups can be made to undergo electrophilic aromatic substitution with sulphonating, nitrating and phosphating reagents.

While not wishing to be bound by theory, copolymers with hydroxyl groups can be esterified

as obtained from ECOTERIC AS 20 and ECOTERIC AS10 (Orica Australia Pty Ltd). Most preferred from the monoalkylsulphosuccinate class are sodium or potassium salts of cyclohexyl, iso-octyl and n-octyl sulphosuccinate. Most preferred from the dialkylsulphosuccinate class are sodium or potassium salts of dicyclohexyl, diisooctyl and di-n-octyl sulphosuccinates. Most preferred from the class of nonionic surfactants loaded onto insoluble porous silicate carriers are ethoxylated surfactants loaded onto carriers such as TERIC 157 (Orica Australia Pty Ltd). Most preferred wetting agents from the urea surfactant complexes are urea adducts of alcohol ethoxylate surfactants such as TERWET 7050 (Orica Australia Pty Ltd). The wetters herein described show good wettability and dispersibility for 10 the formulations and have the additional advantage of showing storage stability in combination with the copolymer dispersants described. Whereas by comparison some commonly used WG and WP wetters such as alkynaphthalene sulphonate salts and lignosulphonate salts have been found to show poor storage stability.

15 In the case of SC formulations in the present invention an active ingredient is typically added to water containing a dispersant, preferably with a surfactant wetting agent together with a conventional non-ionic dispersant. A humectant may also be included. A dispersion is formed using high shear mixing. The dispersion is then milled by any one of several means of wet milling so that the mean particle size of the dispersed solid is below 5 μm more 20 typically in the range of from 1 to 3 μm . The resulting product is known as a millbase and may be modified with additives such as antifreeze, thickeners and antisettling agents, biocides and colouring agents may be added. For an SC formulation to be acceptable it should not

Example 3.

A Simazine 900g/kg WG formulation of the following composition was prepared :

	Simazine tech. (98% w/w)	91.8 % w/w
5	ATPLUS G73050 (now sold under the trademark TERWET 7050, Orica Australia Pty Ltd)	1.5
	DISPERSANT	3.1
	Kaolin	3.1
	Water	0.5%

- 10 The dispersant used was the sodium salt of an alternating copolymer of n-octene and maleic anhydride of approximate molecular weight 20,000 to 30,000. The granules were prepared and tested in the manner described in Example 1. The results are shown in TABLE 1.

Example 4.

- 15 A Simazine 900g/kg WG formulation was prepared and tested in the manner described in Example 3 with the dispersant being the sodium salt of a copolymer of n-decene and maleic anhydride. Results are shown in TABLE 1.

Example 5.

- 20 A Simazine 900g/kg WG formulation was prepared and tested in the manner described in Example 3 with the dispersant being the sodium salt of a copolymer of diisobutylene and maleic anhydride of approximate molecular weight 20,000 to 30,000. Results are shown in TABLE 1.

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Example 6.

A WG formulation was prepared and tested as described in Example 3 with the dispersant being the sodium salt of SMA 1000 (Atochem Inc) which is a 1:1 molar ratio copolymer of styrene and maleic anhydride. Results are shown in TABLE 1.

5

Example 7.

A WG formulation was prepared and tested as described in Example 3 with the dispersant being the sodium salt of SMA 3000 (Atochem Inc) which is a 3:1 molar ratio copolymer of styrene and maleic anhydride. Results are shown in TABLE 1.

10

Example 8.

A WG formulation was prepared and tested as described in Example 3 with the dispersant being the sodium salt of GANTREZ AN 119 resin (Rhodia Inc) which is a copolymer of methylvinyl ether and maleic anhydride. Results are shown in TABLE 1.

15

Example 9

A Simazine 900g/kg WG formulation of the following composition was prepared :

	Simazine tech. (98% w/w)	91.8 % w/w
	ATPLUS G73050	1.5
20	(now sold under the trade mark TERWET 7050, Orica Australia Pty Ltd)	
	DISPERSANT	3.1
	Kaolin	3.1
	Water	0.5%

CLAIMS

1. A method of dispersing an insoluble material in an aqueous solution comprising the following steps:

5

- (i) providing a formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents.
- 10
15
20 (ii) dispersing said formulation in an aqueous medium.

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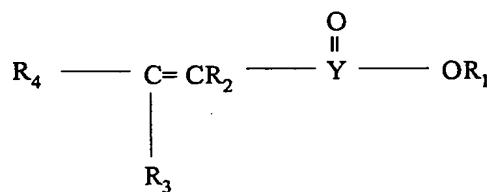
2. A method according to claim 1 wherein the first comonomers are selected from the group consisting of fumaric acid, maleic acid and anhydrides, and the esters, amides and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids, esters and amides, 5 vinylphosphonic acid and the corresponding esters and amides derived from it and ethylene sulphonic acid and the esters and amides derived from it.
3. A method according to claim 1 wherein the second comonomer is selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and 10 methylene cyclopentane.
4. A method according to claim 1 wherein the second comonomer is selected from the group consisting of substituted and unsubstituted norbornene, cyclopentadiene and substituted cyclopentadienes, substituted and unsubstituted dicyclopentadienes , 15 cyclohexenes, furans and indenes.
5. A method according to claim 1 wherein the second comonomer is selected from the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl 20 pyrans and, vinyl pyrrolidones.
6. A method according to claim 1 wherein the second comonomer is an α -olefin

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having an alkyl group selected from the group consisting of diisobutylene, isobutylene, n-octene, n-decene, allyglycidylether or vinylisobutylether.

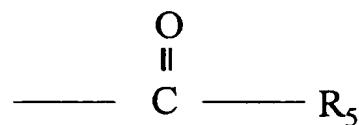
7. A method according to claim 1 wherein the first comonomer has a structure I

5



I

wherein R₁ is M a metal, quaternary ammonium, phosphonium or sulphonium residue, R₂ is hydrogen or C₁ to C₄ alkyl, Y is a carbon atom, O=S, or POR₁ a hydrogen atom or 10 alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R₄ is H, an alkyl radical or a carboxylic acid derivative of form II



II

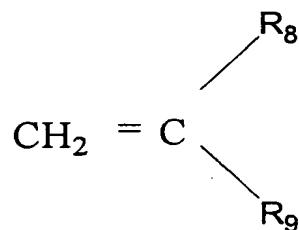
15 wherein R₅ is OR₆, NR₆R₇, SR₆,

- 45 -

wherein R₆, R₇, are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent.

8. A method according to claim 1 wherein the second comonomer has a structure III

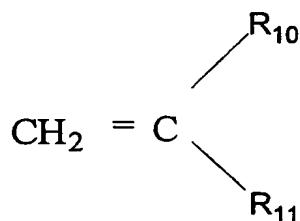
5



III

wherein R₈ represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R₉ represents hydrogen, a branched chain alkyl radical from 1-12 carbon atoms, or cycloalkyl radical,

10 and/or a vinyl compound of formula IV

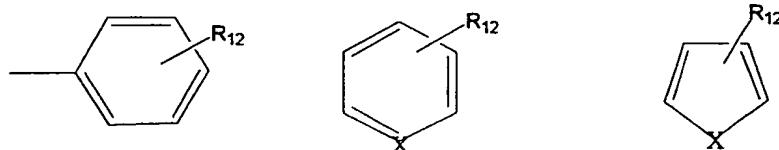


IV

- 46 -

wherein R_{10} is a straight or branched chain alkyl radical of from 1-4 carbons and R_{11} is given by formula V, VI or VII,

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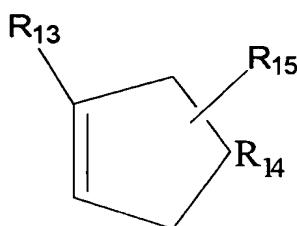


V

VI

VII

wherein R_{12} represents one or more alkyl radicals or one or more of H, Cl, OR and SO_3R_1
NO₂, PO₃R₁ and X is a hetero atom other than carbon; and/or an olefin shown by formula
10 VIII,



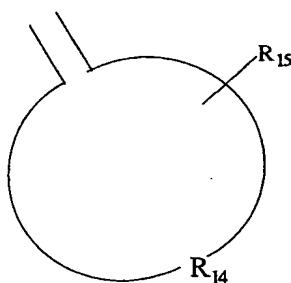
VIII

wherein R_{13} is Cl, or SO_3R_1 , alkyl, O-alkyl, O-aryl and R_{14} , represents from 4-20 carbon

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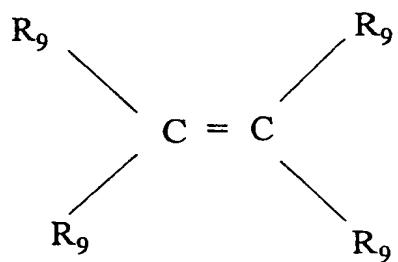
atoms such as to make H a cyclic or polycyclic alkane or polyalkenyl compound, R₁₅, is an epoxide or SO₃R₁ reacted with an unsaturated portion of the ring comprising R₁₄; and/or an exocyclic olefin shown by formula IX

5



IX

and/or an internal olefin shown by formula X,



X

where R_9 is the same or different and as hereinabove defined.

- 5 9. A method according to claim 1 wherein the copolymer contains additional comonomer residues which will not substantially change the character of the copolymer.
10. An agricultural formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents.
- 20

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11. An agricultural formulation according to claim 10 wherein the formulation is in the form of a suspension concentrate (SC), a wettable powder (WP) or a water dispersible granule (WG).

5 12. A method according to claim 10 wherein first comonomers are selected from the group consisting of fumaric acid, maleic acid and anhydrides, and the esters, amides and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids, esters and amides, vinylphosphonic acid and the corresponding esters and amides derived from it and
10 ethylene sulphonic acid and the esters and amides derived from it.

13. A method according to claim 10 wherein the second comonomers are selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane.

15

14. A method according to claim 10 wherein the second comonomers are selected from the group consisting of substituted and unsubstituted norbornene, cyclopentadiene and substituted cyclopentadienes, substituted and unsubstituted dicyclopentadienes , cyclohexenes, furans and indenes.

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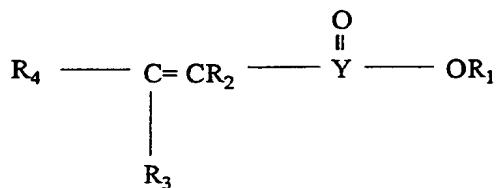
15. A method according to claim 10 wherein the second comonomers are selected from the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl

- 50 -

cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl pyrans and, vinyl pyrrolidones.

16. A method according to claim 10 wherein the first comonomers are selected from
 5 the group consisting of an α -olefin having an alkyl group selected from the group
 consisting of diisobutylene, isobutylene, n-octene, n-decene, allylglycidylether or
 vinylisobutylether.

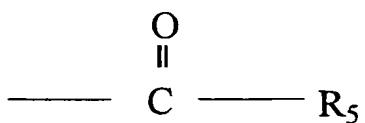
17. A method according to claim 10 wherein the first comonomers are selected from
 10 the group consisting of structure I



I

wherein R_1 is M a metal, quaternary ammonium, phosphonium or sulphonium residue, R_2
 15 is hydrogen or C_1 to C_4 alkyl, Y is a carbon atom, $\text{O}=\text{S}$, or POR_1 a hydrogen atom or
 alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R_4 is H,
 an alkyl radical or a carboxylic acid derivative of form II

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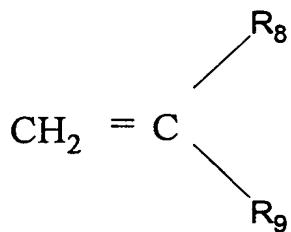
II

wherein R_5 is OR_6 , NR_6R_7 , SR_6 ,

5 wherein R_6 , R_7 , are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent.

18. A method according to claim 10 wherein the first comonomer is selected from the group consisting of III

10

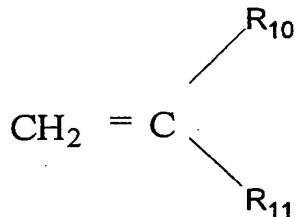


III

wherein R_8 represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R_9 represents hydrogen, a branched chain alkyl radical from 1-12 carbon atoms, or

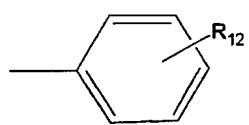
- 52 -

cycloalkyl radical, and/or a vinyl compound of formula IV



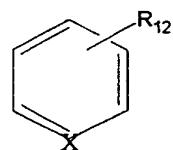
IV

5 wherein R_{10} is a straight or branched chain alkyl radical of from 1-4 carbons and R_{11} is given by formula V, VI or VII,

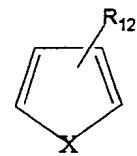


10

V



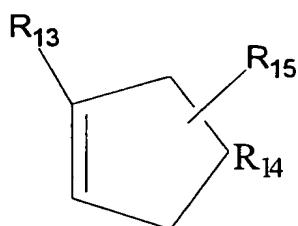
VI



VII

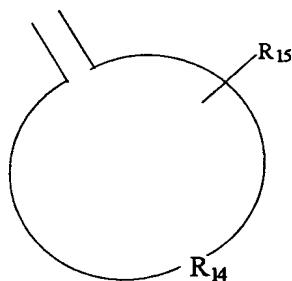
wherein R_{12} represents one or more alkyl radicals or one or more of $\text{H}, \text{Cl}, \text{OR}$ and SO_3R_1 , NO_2 , PO_3R_1 and X is a hetero atom other than carbon; and/or an olefin shown by formula VIII,

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VIII

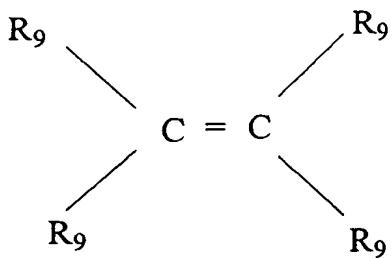
wherein R₁₃ is Cl, or SO₃R₁, alkyl, O-alkyl, O-aryl and R₁₄, represents from 4-20 carbon atoms such as to make H a cyclic or polycyclic alkane or polyalkenyl compound, R₁₅, is 5 an epoxide or SO₃R₁ reacted with an unsaturated portion of the ring comprising R₁₄; and/or an exocyclic olefin shown by formula IX



IX

10 and/or an internal olefin shown by formula X,

- 54 -



X

where R₉ is the same or different and as hereinabove defined.

5

19. A method according to claim 10 wherein the copolymer contains additional comonomer residues which will not substantially change the character of the copolymer.

20. An agricultural formulation according to claim 10 wherein the dispersant is readily
10 soluble in water.

21. An agricultural formulation according to claim 10 wherein the dispersant is an agriculturally acceptable salt of the copolymer and wherein the salt comprises sodium, potassium and/or ammonium ions.

15

22. An agricultural formulation according to claim 10 wherein the copolymer is

polyanionic.

23. An agricultural formulation according to claim 10 wherein the copolymer is in the form of its free acid.

5

24. An agricultural formulation according to claim 10 wherein the dispersant is a water-soluble agriculturally acceptable derivative of the copolymer wherein said derivative is selected from the group consisting of polyalkyleneoxy derivatives, polyethyleneglycol derivatives, polyamide derivatives and polyvinyl alcohol derivatives.

10

25. An agricultural formulation according to claim 10 wherein copolymers are in the range of from 1000 to 90000 daltons.

15

26. An agricultural formulation according to claim 10 wherein copolymers are in the range of from 1,000 to 30,000 daltons.

27. An agricultural formulation according to claim 10 wherein copolymers are in the range of from 10,000 to 30,000 daltons.

20

28. An agricultural formulation according to claim 10 wherein the water-insoluble materials are selected from the group consisting of herbicides, insecticides, fungicides, biocides, molluscicides, algaicides, plant growth regulators, anthelmintics, rodenticides, nematocides, acaricides, amoebicides, protozoacides, fertilizers, crop safeners fillers and

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carriers and other adjuvants.

29. An agricultural formulation according to claim 10 wherein the formulation further comprises a surfactant wetting agent.

5

30. A method of making an agrochemical formulation comprising the steps of:

(i) combining at least one insoluble material, and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents;

20
31. A method according to claim 30 comprising the steps of:

- (i) combining at least one insoluble material, and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents;
- 15 (ii) milling said combination to a particle size range in order to obtain a stable, readily-suspendible aqueous dispersion; and
- (iii) stabilising said aqueous dispersion to obtain an SC formulation suitable for dilution in water for agricultural use.
- 20
32. A method according to claim 30 comprising the steps of:

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- (i) combining at least one insoluble material, with at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents; and
- 15 (ii) milling said combination to a desired particle size to obtain a homogeneous wettable powder (WP) formulation.
33. A method according to claim 30 comprising the steps of:
- 20 (i) combining at least one insoluble material suitable for agricultural use with at least one dispersant comprising a copolymer wherein said copolymer comprises a

- residue of a first comonomer and a residue of a second comonomer, wherein said
first comonomer is an α,β -unsaturated oxyacid or anhydride and said second
comonomer is an olefin having at least one polymerizable double bond and wherein
at least one of said first comonomer and said second comonomer is substituted,
5 wherein the substituents for said first comonomer are selected from the group
 consisting of esters, amides, thioesters and functional groups derived from reaction
 with nucleophilic reagents and wherein the substituents for the second comonomer
 are selected from the group consisting of epoxides; sulfonates; esters; amides; and
 optionally substituted pendent aromatic and heteroaromatic groups wherein said
10 optional substituents are selected from the group consisting of sulfonates, nitrates,
 phosphates and other substituents derived from reaction with electrophilic reagents;
 and

(ii) blending said combination to obtain a homogeneous wettable powder (WP)
15 formulation.

34. A method according to claim 30 comprising the steps of:

- (i) combining at least one insoluble material suitable for agricultural use with at least
20 one dispersant comprising a copolymer wherein said copolymer comprises a
 residue of a first comonomer and a residue of a second comonomer, wherein said
 first comonomer is an α,β -unsaturated oxyacid or anhydride and said second

- 60 -

- comonomer is an olefin having at least one polymerizable double bond and wherein
at least one of said first comonomer and said second comonomer is substituted,
wherein the substituents for said first comonomer are selected from the group
consisting of esters, amides, thioesters and functional groups derived from reaction
5 with nucleophilic reagents and wherein the substituents for the second comonomer
are selected from the group consisting of epoxides; sulfonates; esters; amides; and
optionally substituted pendent aromatic and heteroaromatic groups wherein said
optional substituents are selected from the group consisting of sulfonates, nitrates,
phosphates and other substituents derived from reaction with electrophilic reagents;
- 10 (ii) agglomerating said combination to form discrete granular materials; and
- (iii) drying said granular materials to obtain a water dispersible granule WG
formulation.
- 15 35. A method according to claim 30 wherein the first comonomers are selected from
the group consisting of fumaric acid, maleic acid and anhydrides, and the esters, amides
and imides derived from them, itaconic acid and anhydride and the corresponding esters
amides and imides derived from them, acrylic and methacrylic acids, esters and amides,
20 vinylphosphonic acid and the corresponding esters and amides derived from it and
ethylene sulphonic acid and the esters and amides derived from it.

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36. A method according to claim 30 wherein the second comonomer is selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane.

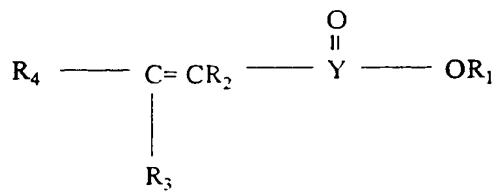
5 37. A method according to claim 30 wherein the second comonomer is selected from the group consisting of substituted and unsubstituted norbornene, cyclopentadiene and substituted cyclopentadienes, substituted and unsubstituted dicyclopentadienes , cyclohexenes, furans and indenes.

10 38. A method according to claim 30 wherein the second comonomer is selected from the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl pyrans and, vinyl pyrrolidones.

15 39. A method according to claim 30 wherein the second comonomer is an α -olefin having an alkyl group selected from the group consisting of diisobutylene, isobutylene, n-octene, n-decene, allylglycidylether or vinylisobutylether.

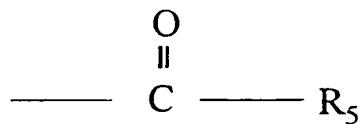
40. A method according to claim 30 wherein the first comonomer has a structure I

- 62 -



I

wherein R_1 is M a metal, quaternary ammonium, phosphonium or sulphonium residue, R_2 is hydrogen or C_1 to C_4 alkyl, Y is a carbon atom, $\text{O}=\text{S}$, or POR_1 a hydrogen atom or 5 alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R_4 is H, an alkyl radical or a carboxylic acid derivative of form II



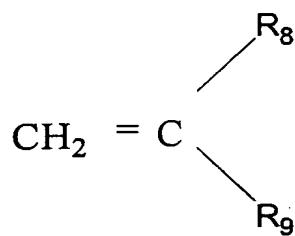
II

10 wherein R_5 is OR_6 , NR_6R_7 , SR_6 ,

wherein R_6 , R_7 , are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent.

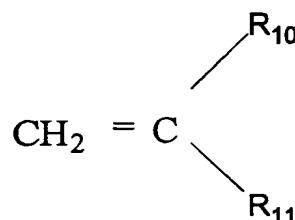
41. A method according to claim 30 wherein the second comonomer has a structure III

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III

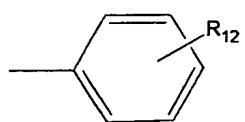
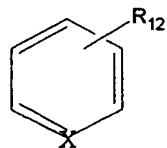
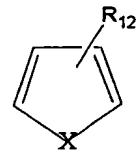
wherein R₈ represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R₉ represents hydrogen, a branched chain alkylradical from 1-12 carbon atoms, or
5 cycloalkyl radical,
and/or a vinyl compound of formula IV



IV

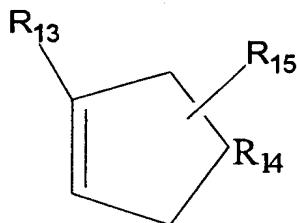
10 wherein R₁₀ is a straight or branched chain alkyl radical of from 1-4 carbons and R₁₁ is given by formula V, VI or VII,

- 64 -

**V****VI****VII**

5

wherein R₁₂ represents one or more alkyl radicals or one or more of H, Cl, OR and SO₃R₁, NO₂, PO₃R₁ and X is a hetero atom other than carbon; and/or an olefin shown by formula VIII,



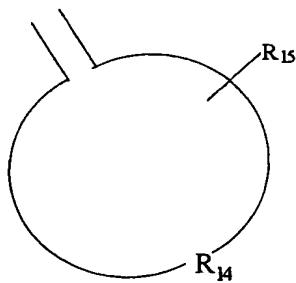
10

VIII

wherein R₁₃ is Cl, or SO₃R₁, alkyl, O-alkyl, O-aryl and R₁₄, represents from 4-20 carbon atoms such as to make H a cyclic or polycyclic alkane or polyalkenyl compound, R₁₅, is an epoxide or SO₃R₁ reacted with an unsaturated portion of the ring comprising R₁₄;

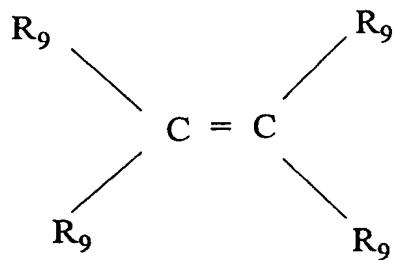
- 65 -

and/or an exocyclic olefin shown by formula IX



IX

5 and/or an internal olefin shown by formula X,



X

where R₉ is the same or different and as hereinabove defined.

42. A method according to claim 30 wherein the copolymer contains additional comonomer residues which will not substantially change the character of the polymer.

5

43. An agricultural formulation according to claim 30 wherein the dispersant is readily soluble in water.

44. An agricultural formulation according to claim 30 wherein the dispersant is an agriculturally acceptable salt of the copolymer and wherein the salt comprises sodium, potassium and/or ammonium ions.

45. An agricultural formulation according to claim 30 wherein the copolymer is polyanionic.

15

46. An agricultural formulation according to claim 30 wherein the copolymer is in the form of its free acid.

47. An agricultural formulation according to claim 30 wherein the dispersant is a water-soluble agriculturally acceptable derivative of the copolymer wherein said derivative is selected from the group consisting of polyalkyleneoxy derivatives, polyethyleneglycol derivatives, polyamide derivatives and polyvinyl alcohol derivatives.

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48. An agricultural formulation according to claim 30 wherein copolymers are in the range of from 1000 to 90000 daltons.

49. An agricultural formulation according to claim 30 wherein copolymers are in the 5 range of from 1,000 to 30,000 daltons.

50. An agricultural formulation according to claim 30 wherein copolymers are in the range of from 1,000 to 10,000 daltons.

10 51. An agricultural formulation according to claim 30 wherein the water-insoluble materials are selected from the group consisting of herbicides, insecticides, fungicides, biocides, molluscicides, algaicides, plant growth regulators, anthelmintics, rodenticides, nematocides, acaricides, amoebicides, protozoacides, fertilizers, crop safeners fillers and carriers and other adjuvants.

15

52. An agricultural formulation according to claim 30 wherein the formulation further comprises a surfactant wetting agent.

20 53. A method according to any one of claims 32 to 34 wherein said dispersant achieves a percentage suspensibility of greater than 80%.

54. A method according to claim 31 wherein said dispersant achieves a percentage suspensibility of greater than 90%.

- 68 -

55. A method according to either claim 32 or claim 33 wherein the milling step produces a mean particle size in the range of from 5 to 15 μm .

56. A method according to claim 55 wherein the wettable powder has a wettability of 5 less than 1 minute and a suspensibility above 80%.

57. A method according to claim 34 wherein the milling step produces a mean particle size in the range of from 5 to 15 μm .

10 58. A method according to claim 34 wherein the formulation has a dispersion time of less than 1 minute.

59. A method according to claim 34 wherein the formulation has a dispersion time of less than 20 seconds.

15

60. A method according to claim 34 wherein the formulation has a suspensibility of above 80%.

61. A method according to claim 34 wherein the formulation has a wet sieve retention.

20 For a 150 μm sieve is less than 0.1% retained material and is for a 53 μm sieve is less than 0.6%.

62. A method according to claim 31 wherein the milling step produces a mean particle

size of less than 5 μm.

63. A method according to claim 31 wherein the milling step produces a mean particle size in the range of from 1 to 3 μm.

5

64. An agricultural formulation produced by the method of any one of claims 31 to 34.

65. a method of treatment of a substrate with an insoluble material comprising the following steps:

10

(i) preparing a formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β-unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates,

15

20

phosphates and other substituents derived from reaction with electrophilic reagents;

(ii) dispersing said formulation in an aqueous medium; and

5 (iii) applying the dispersed formulation to a substrate.

66. A method according to claim 65 wherein the first comonomers are selected from the group consisting of fumaric acid, maleic acid and anhydrides, and the esters, amides 10 and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids, esters and amides, vinylphosphonic acid and the corresponding esters and amides derived from it and ethylene sulphonic acid and the esters and amides derived from it.

15 67. A method according to claim 65 wherein the second comonomer is selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and 20 methylene cyclopentane.

68. A method according to claim 65 wherein the second comonomer is selected from 20 the group consisting of substituted and unsubstituted norbornene, cyclopentadiene and substituted cyclopentadienes, substituted and unsubstituted dicyclopentadienes , cyclohexenes, furans and indenes.

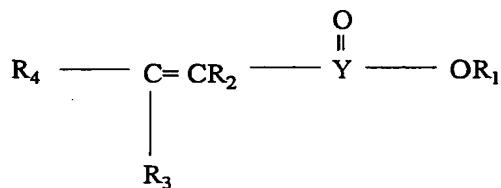
- 71 -

69. A method according to claim 65 wherein the second comonomer is selected from the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl pyrans and, vinyl pyrrolidones.

5

70. A method according to claim 65 wherein the second comonomer is an α -olefin having an alkyl group selected from the group consisting of diisobutylene, isobutylene, n-octene, n-decene, allylglycidylether or vinylisobutylether.

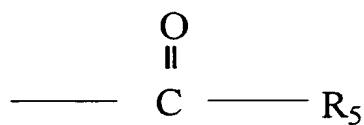
10 71. A method according to claim 65 wherein the first comonomer has a structure I



I

wherein R_1 is M a metal, quaternary ammonium, phosphonium or sulphonium residue, R_2 15 is hydrogen or C_1 to C_4 alkyl, Y is a carbon atom, $\text{O}=\text{S}$, or POR_1 a hydrogen atom or alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R_4 is H, an alkyl radical or a carboxylic acid derivative of form II

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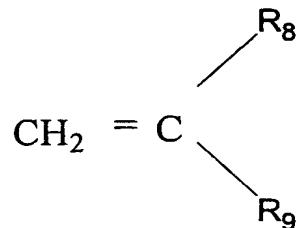


II

wherein R_5 is OR_6 , NR_6R_7 , SR_6 ,

5 wherein R_6 , R_7 , are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent.

72. A method according to claim 65 wherein the second comonomer has a structure III

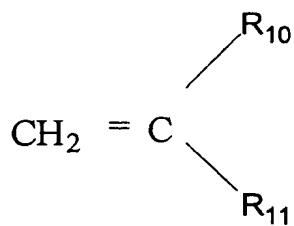


III

10

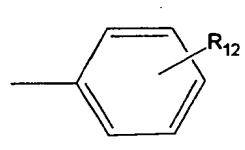
wherein R_8 represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R_9 represents hydrogen, a branched chain alkylradical from 1-12 carbon atoms, or cycloalkyl radical,
and/or a vinyl compound of formula IV

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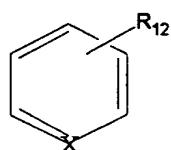


IV

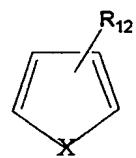
wherein R_{10} is a straight or branched chain alkyl radical of from 1-4 carbons and R_{11} is given by formula V, VI or VII,



V



VI

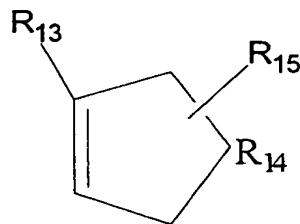


VII

10

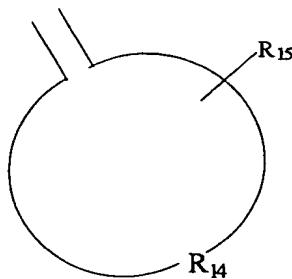
wherein R_{12} represents one or more alkyl radicals or one or more of H, Cl, OR and SO_3R_1 , NO_2 , PO_3R_1 and X is a hetero atom other than carbon; and/or an olefin shown by formula VIII,

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VIII

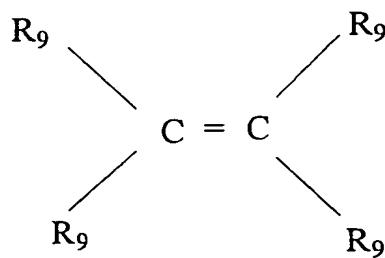
wherein R_{13} is Cl, or SO_3R_1 , alkyl, O-alkyl, O-aryl and R_{14} , represents from 4-20 carbon atoms such as to make H a cyclic or polycyclic alkane or polyalkenyl compound, R_{15} , is
5 an epoxide or SO_3R_1 reacted with an unsaturated portion of the ring comprising R_{14} ;
and/or an exocyclic olefin shown by formula IX



IX

10 and/or an internal olefin shown by formula X,

- 75 -



X

where R_9 is the same or different and as hereinabove defined.

5

73. A method according to claim 65 wherein the copolymer contains additional comonomer residues which will not substantially change the character of the copolymer.

74. An agricultural formulation according to claim 65 wherein the dispersant is readily
10 soluble in water.

75. An agricultural formulation according to claim 65 wherein the dispersant is an agriculturally acceptable salt of the copolymer and wherein the salt comprises sodium, potassium and/or ammonium ions.

15

76. An agricultural formulation according to claim 65 wherein the copolymer is

polyanionic.

77. An agricultural formulation according to claim 65 wherein the copolymer is in the form of its free acid.

5

78. An agricultural formulation according to claim 65 wherein the dispersant is a water-soluble agriculturally acceptable derivative of the copolymer wherein said derivative is selected from the group consisting of polyalkyleneoxy derivatives, polyethyleneglycol derivatives, polyamide derivatives and polyvinyl alcohol derivatives.

10

79. An agricultural formulation according to claim 65 wherein copolymers are in the range of from 1000 to 90000 daltons.

15

80. An agricultural formulation according to claim 65 wherein copolymers are in the range of from 1000 to 30000 daltons.

81. An agricultural formulation according to claim 65 wherein copolymers are in the range of from 1000 to 10000 daltons.

20

82. An agricultural formulation according to claim 65 wherein the water-insoluble materials are selected from the group consisting of herbicides, insecticides, fungicides, biocides, molluscicides, algaicides, plant growth regulators, anthelmintics, rodenticides, nematocides, acaricides, amoebicides, protozoacides, fertilizers, crop safeners fillers and

- 77 -

carriers and other adjuvants.

83. An agricultural formulation according to claim 65 wherein the formulation further comprises a surfactant wetting agent.

5

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- 12 -

not used

invention include fumaric acid, maleic acid and anhydrides, and the esters, amides and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids and the corresponding esters and amides derived from them, vinylphosphonic acid and the corresponding esters and amides derived from it and ethylene sulphonic acid and the esters and amides derived from it.

The second comonomer for use in the present invention is an olefin having at least one polymerizable double bond which may be substituted as defined herein.

10

The second comonomer for use in the second embodiment of the present invention may be an alicyclic monomer having a polymerizable exo-cyclic double bond. It will be understood that by alicyclic monomer is meant an aliphatic cyclic monomer containing moieties such as a cyclic alkyl, cyclic alkenyl or heterocyclic groups and which may comprise one or more carbocyclic or heterocyclic rings. It will be understood that by exo-cyclic is meant an alkylidene substituted cyclic structure. Alicyclic monomers having a polymerizable exo-cyclic double bond may optionally be substituted. Alicyclic monomers having a polymerizable exo-cyclic double bond of the present invention may include, for example, β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane. The most preferred alicyclic monomer having a polymerizable exo-cyclic double bond.

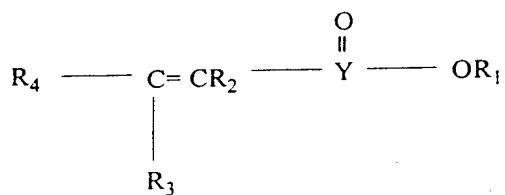
The second comonomer for use in the second embodiment of the present invention may be an alicyclic monomer having a polymerizable endo-cyclic double bond. The term alicyclic

- 14 -

allyglycidylether or vinylisobutylether. The second comonomer may also be an internal olefin.

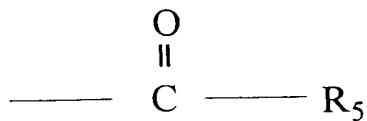
Preferred examples of the first comonomer may be described as having structure I

5



II

wherein R_1 is a metal, quaternary ammonium, phosphonium or sulphonium residue, R_2 is hydrogen or C_1 to C_4 alkyl, Y is a carbon atom, $\text{O}=\text{S}$, or POR where R is a hydrogen atom or alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R_4 is H, an alkyl radical or a carboxylic acid derivative of form II

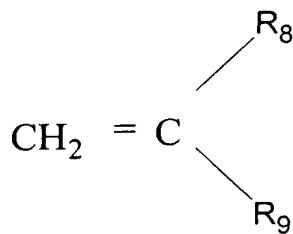


III

15 wherein R_5 is OR_6 , NR_6R_7 , SR_6 ,

- 15 -

wherein R₆ and R₇ are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent. The second comonomer may be alternatively described as a residue having formula III

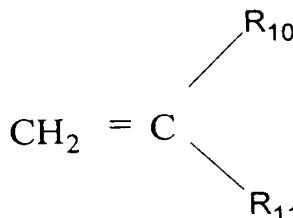


5

III

wherein R₈ represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R₉ represents hydrogen, a branched chain alkyl radical of from 1-12 carbon atoms, or a cycloalkyl radical, and/or a vinyl compound of formula IV

10

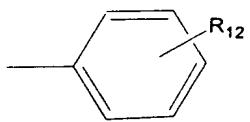


IV

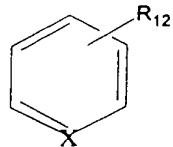
- 16 -

wherein R_{10} is a straight or branched chain alkyl radical of from 1-4 carbons and R_{11} is given by formula V, VI or VII,

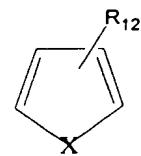
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V



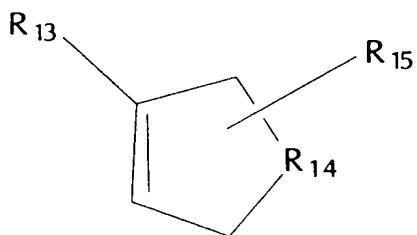
VI



VII

wherein R_{12} represents one or more alkyl radicals or one or more of H, Cl, OR and $SQ\ R$ NO_2 , PO_3R_1 and X is a hetero atom other than carbon; and/or an olefin shown by formula 10 VIII,

15



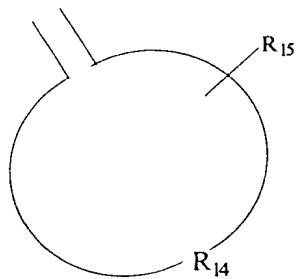
VIII

wherein R_{13} is Cl, SO_3R_1 , alkyl, O-alkyl or O-aryl, and R_{14} represents from 4-20 carbon

- 17 -

atoms such as to make a cyclic or polycyclic alkane or polyalkenyl compound, R₁₅, is an epoxide or SO₃R₁ reacted with an unsaturated portion of the ring comprising R₁₄; and/or an exocyclic olefin shown by formula IX

5

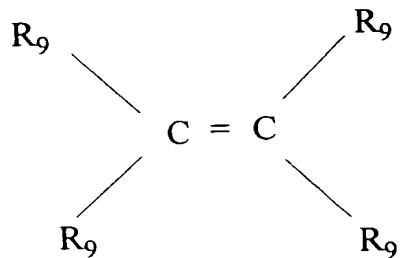


IX

10

and/or an internal olefin shown by formula X,

15



X

20

- 29 -

as obtained from ECOTERIC AS 20 and ECOTERIC AS10 (Huntsman Corporation Australia Pty Ltd). Most preferred from the monoalkylsulphosuccinate class are sodium or potassium salts of cyclohexyl, iso-octyl and n-octyl sulphosuccinate. Most preferred from the dialkylsulphosuccinate class are sodium or potassium salts of dicyclohexyl, diisooctyl and di-
5 n-octyl sulphosuccinates. Most preferred from the class of nonionic surfactants loaded onto insoluble porous silicate carriers are ethoxylated surfactants loaded onto carriers such as TERIC 157 (Huntsman Corporation Australia Pty Ltd). Most preferred wetting agents from the urea surfactant complexes are urea adducts of alcohol ethoxylate surfactants such as TERWET 7050 (Huntsman Corporation Australia Pty Ltd). The wetters herein described
10 show good wettability and dispersibility for the formulations and have the additional advantage of showing storage stability in combination with the copolymer dispersants described. Whereas by comparison some commonly used WG and WP wetters such as alkylnaphthalene sulphonate salts and lignosulphonate salts have been found to show poor storage stability.

15

In the case of SC formulations in the present invention an active ingredient is typically added to water containing a dispersant, preferably with a surfactant wetting agent together with a conventional non-ionic dispersant. A humectant may also be included. A dispersion is formed using high shear mixing. The dispersion is then milled by any one of several means
20 of wet milling so that the mean particle size of the dispersed solid is below 5 μm more typically in the range of from 1 to 3 μm . The resulting product is known as a millbase and may be modified with additives such as antifreeze, thickeners and antisettling agents, biocides and colouring agents may be added. For an SC formulation to be acceptable it should not

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Example 3.

A Simazine 900g/kg WG formulation of the following composition was prepared :

	Simazine tech. (98% w/w)	91.8 % w/w
5	ATPLUS G73050 (now sold under the trademark TERWET 7050, Huntsman Corporation Australia Pty Ltd)	1.5
	DISPERSANT	3.1
	Kaolin	3.1
10	Water	0.5%

The dispersant used was the sodium salt of an alternating copolymer of n-octene and maleic anhydride of approximate molecular weight 20,000 to 30,000. The granules were prepared and tested in the manner described in Example 1. The results are shown in TABLE 1.

15 Example 4.

A Simazine 900g/kg WG formulation was prepared and tested in the manner described in Example 3 with the dispersant being the sodium salt of a copolymer of n-decene and maleic anhydride. Results are shown in TABLE 1.

20 Example 5.

A Simazine 900g/kg WG formulation was prepared and tested in the manner described in Example 3 with the dispersant being the sodium salt of a copolymer of diisobutylene and maleic anhydride of approximate molecular weight 20,000 to 30,000. Results are shown in TABLE 1.

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Example 6.

A WG formulation was prepared and tested as described in Example 3 with the dispersant being the sodium salt of SMA 1000 (Atochem Inc) which is a 1:1 molar ratio copolymer of styrene and maleic anhydride. Results are shown in TABLE 1.

5

Example 7.

A WG formulation was prepared and tested as described in Example 3 with the dispersant being the sodium salt of SMA 3000 (Atochem Inc) which is a 3:1 molar ratio copolymer of styrene and maleic anhydride. Results are shown in TABLE 1.

10

Example 8.

A WG formulation was prepared and tested as described in Example 3 with the dispersant being the sodium salt of GANTREZ AN 119 resin (Rhodia Inc) which is a copolymer of methylvinyl ether and maleic anhydride. Results are shown in TABLE 1.

15

Example 9

A Simazine 900g/kg WG formulation of the following composition was prepared :

	Simazine tech. (98% w/w)	91.8 % w/w
	ATPLUS G73050	1.5
20	(now sold under the trade mark TERWET 7050, Huntsman Corporation Australia Pty Ltd)	
	DISPERSANT	3.1
	Kaolin	3.1
25	Water	0.5%

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CLAIMS

1. A method of dispersing an insoluble material in an aqueous solution comprising the following steps:

5

- (i) providing a formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein the second comonomer is selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentene;
- 10 (ii) dispersing said formulation in an aqueous medium.

15

2. A method according to claim 1 wherein the copolymer contains additional comonomer residues which will not substantially change the character of the copolymer.

3. A method of treatment of a substrate with an insoluble material comprising the following steps:

20 25

- (i) preparing a formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein the second comonomer is selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane;

30

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(ii) dispersing said formulation in an aqueous medium; and

(iii) applying the dispersed formulation to a substrate.

5 4. A method of treatment of a substrate with an insoluble material comprising the following steps:

(i) preparing a formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of
10 a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein the second comonomer is selected from the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl pyrans and vinyl pyrrolidones;
15

(ii) dispersing said formulation in an aqueous medium; and

(iii) applying the dispersed formulation to a substrate.

20 5. A method of treatment of a substrate with an insoluble material comprising the following steps:

(i) preparing a formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of
25 a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein the second comonomer is an α -olefin having an alkyl group selected from the group consisting of diisobutylene, isobutylene, n-octene, n-decene, allylglycidylether or
30

- 44 -

vinylisobutylether;

(ii) dispersing said formulation in an aqueous medium; and

5 (iii) applying the dispersed formulation to a substrate.

6. A method of treatment of a substrate with an insoluble material comprising the following steps:

10 (i) preparing a formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted,
15 wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents,
20 wherein said comonomer is in free acid form;

25 (ii) dispersing said formulation in an aqueous medium; and

(iii) applying the dispersed formulation to a substrate.

30 7. A method of treatment of a substrate with an insoluble material comprising the

- 45 -

following steps:

- (i) preparing a formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents, wherein the dispersant is a water-soluble agriculturally acceptable derivative of the copolymer wherein said derivative is selected from the group consisting of polyalkyleneoxy derivatives, polyethyleneglycol derivatives, polyamide derivatives and polyvinyl alcohol derivatives;
- (ii) dispersing said formulation in an aqueous medium; and
- (iii) applying the dispersed formulation to a substrate.

8. A method of treatment of a substrate with an insoluble material comprising the following steps:

- (i) preparing a formulation comprising at least one insoluble material, a surfactant wetting agent and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second

- 46 -

comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents;

- 5 (ii) dispersing said formulation in an aqueous medium; and
10 (iii) applying the dispersed formulation to a substrate.

9. A method of dispersing active water-insoluble agrochemical principal in an aqueous solution comprising the following steps:

15 (i) providing a formulation comprising at least one active water-insoluble agrochemical principal and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic

20 (ii) dispersing said formulation in an aqueous medium; and
25 (iii) applying the dispersed formulation to a substrate.

- 47 -

and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents;

5 (ii) dispersing said formulation in an aqueous medium.

10. A method according to claim 9 wherein the first comonomers are selected from the group consisting of fumaric acid, maleic acid and anhydrides, and the esters, amides and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids and the corresponding esters and amides derived from them, vinylphosphonic acid and the corresponding esters and amides derived from it and ethylene sulphonic acid and the esters and amides derived from it.

15

11. A method according to claim 9 wherein the second comonomer is selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane.

20

12. A method according to claim 9 wherein the second comonomer is selected from the group consisting of substituted and unsubstituted norbornene, cyclopentadiene and substituted cyclopentadienes, substituted and unsubstituted dicyclopentadienes , cyclohexenes, furans and indenes.

25

13. A method according to claim 9 wherein the second comonomer is selected from the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl pyrans and, vinyl pyrrolidones.

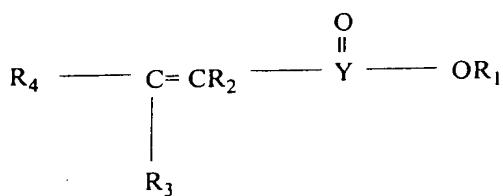
30 14. A method according to claim 9 wherein the second comonomer is an α -olefin

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having an alkyl group selected from the group consisting of diisobutylene, isobutylene, n-octene, n-decene, allyglycidylether or vinylisobutylether.

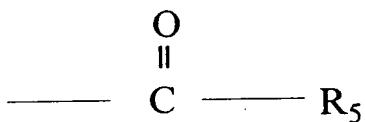
15. A method according to claim 9 wherein the first comonomer has a structure I

5



II

wherein R₁ is a metal, quaternary ammonium, phosphonium or sulphonium residue, R₂ is hydrogen or C₁ to C₄ alkyl, Y is a carbon atom, O=S, or POR where R is a hydrogen atom or alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R₄ is H, an alkyl radical or a carboxylic acid derivative of formula II



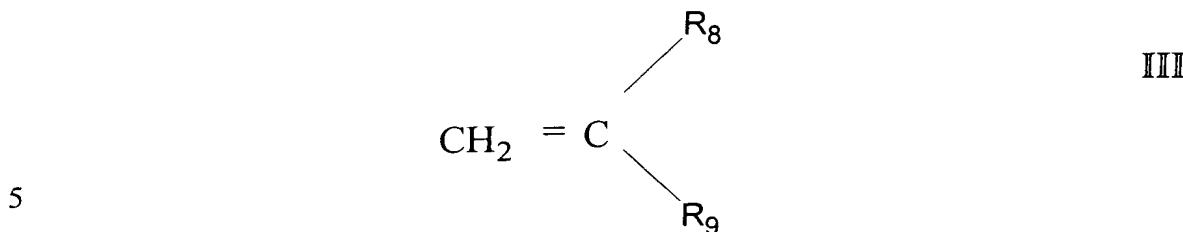
III

15 wherein R₅ is OR₆, NR₆R₇, or SR₆,

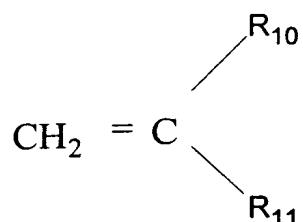
wherein R₆ and R₇ are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent.

16. A method according to claim 9 wherein the second comonomer is a vinyl compound of formula III

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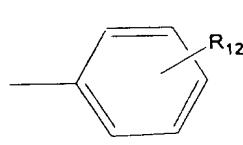


wherein R_8 represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R_9 represents hydrogen, a branched chain alkyl radical of from 1-12 carbon atoms, 10 or cycloalkyl radical,
and/or a vinyl compound of formula IV

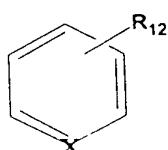


IV

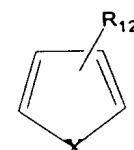
15 wherein R_{10} is a straight or branched chain alkyl radical of from 1-4 carbons and R_{11} is given by formula V, VI or VII,



V



VI

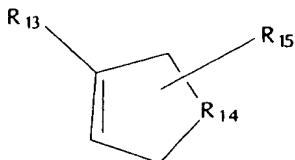


VII

- 50 -

wherein R₁₂ represents one or more alkyl radicals or one or more of H, Cl, OR and SO₃R₁, NO₂, PO₃R₁ and X is a hetero atom other than carbon; and/or an olefin shown by formula VIII,

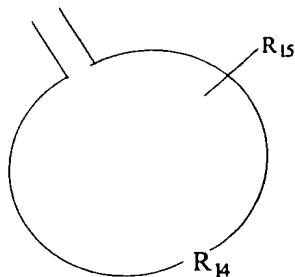
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VIII

wherein R₁₃ is Cl, SO₃R₁, alkyl, O-alkyl or O-aryl, and R₁₄ represents from 4-20 carbon atoms such as to make a cyclic or polycyclic alkane or polyalkenyl compound, R₁₅ is an epoxide or SO₃R₁ reacted with an unsaturated portion of the ring comprising R₁₄; and/or an exocyclic olefin shown by formula IX

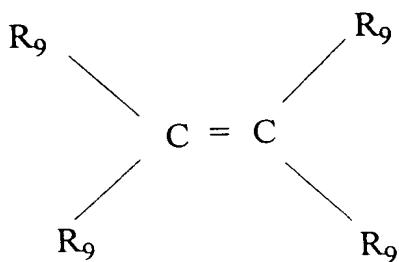
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IX

20

and/or an internal olefin shown by formula X,



X

- 51 -

where R_9 is the same or different and as hereinabove defined.

17. A method according to claim 9 wherein the copolymer contains additional comonomer residues which will not substantially change the character of the copolymer.

5

18. An agricultural formulation comprising at least one insoluble material and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at 10 least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; 15 amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents.

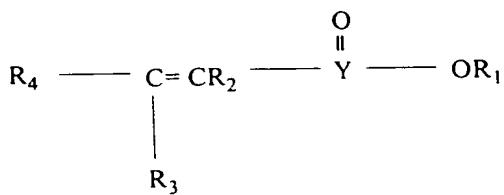
19. An agricultural formulation according to claim 18 wherein the formulation is in the 20 form of a suspension concentrate (SC), a wettable powder (WP) or a water dispersible granule (WG).

20. An agricultural formulation according to claim 18 wherein first comonomers are selected from the group consisting of fumaric acid, maleic acid and anhydrides, and the 25 esters, amides and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids and the esters and amides derived from them, vinylphosphonic acid and the corresponding esters and amides derived from it and ethylene sulphonic acid and the esters and amides derived from it.

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21. An agricultural formulation according to claim 18 wherein the second comonomers are selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane.
- 5 22. An agricultural formulation according to claim 18 wherein the second comonomers are selected from the group consisting of substituted and unsubstituted norbornene, cyclopentadiene and substituted cyclopentadienes, substituted and unsubstituted dicyclopentadienes, cyclohexenes, furans and indenes.
- 10 23. An agricultural formulation according to claim 18 wherein the second comonomers are selected from the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl pyrans and, vinyl pyrrolidones.
- 15 24. An agricultural formulation according to claim 18 wherein the first comonomers are selected from the group consisting of an α -olefin having an alkyl group selected from the group consisting of diisobutylene, isobutylene, n-octene, n-decene, allylglycidylether or vinylisobutylether.
- 20 25. An agricultural formulation according to claim 18 wherein the first comonomers are selected from the group consisting of structure I



I

wherein R_1 is a metal, quaternary ammonium, phosphonium or sulphonium residue, R_2 is hydrogen or C_1 to C_4 alkyl, Y is a carbon atom, $\text{O}=\text{S}$, or POR where R is a hydrogen

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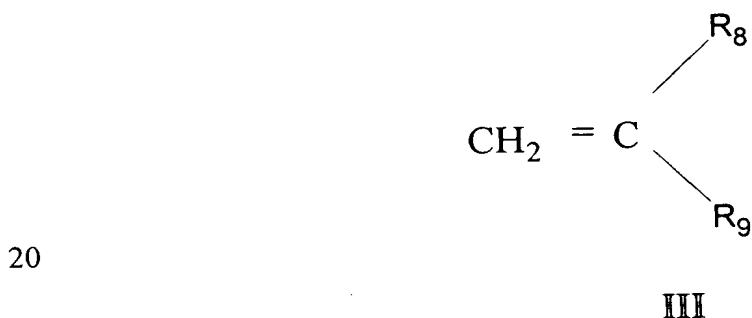
atom or alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R₄ is H, an alkyl radical or a carboxylic acid derivative of formula II



10 wherein R₅ is OR₆, NR₆R₇ or SR₆,

wherein R₆ and R₇ are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent.

26. An agricultural formulation according to claim 18 wherein the first comonomer is
15 selected from the group consisting of III

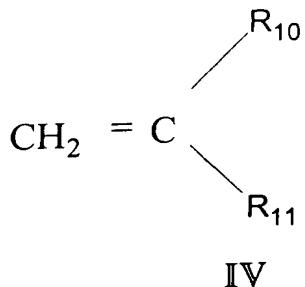


wherein R₈ represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R₉ represents hydrogen, a branched chain alkyl radical of from 1-12 carbon atoms, or a cycloalkyl radical, and/or a vinyl compound of formula IV

25

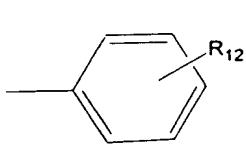
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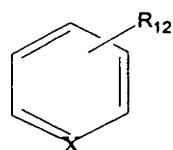


wherein R_{10} is a straight or branched chain alkyl radical of from 1-4 carbons and R_{11} is given by formula V, VI or VII,

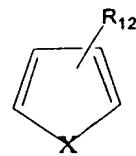
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V



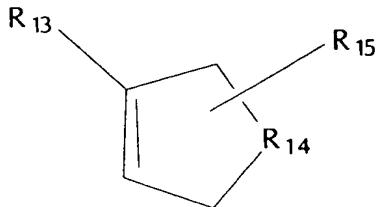
VI



VII

15 wherein R_{12} represents one or more alkyl radicals or one or more of $\text{H}, \text{Cl}, \text{OR}$ and SO_3R_1 , NO_2 , PO_3R_1 and X is a hetero atom other than carbon; and/or an olefin shown by formula VIII,

20



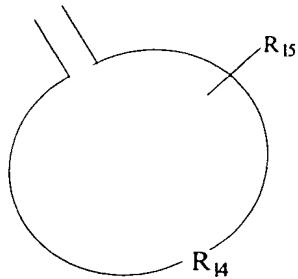
VIII

25 wherein R_{13} is Cl , SO_3R , alkyl, O-alkyl or O-aryl, and R_{14} represents from 4-20 carbon atoms such as to make a cyclic or polycyclic alkane or polyalkenyl compound, R_{15} is an

- 55 -

epoxide or SO_3R_1 , reacted with an unsaturated portion of the ring comprising R_{14} ; and/or an exocyclic olefin shown by formula IX

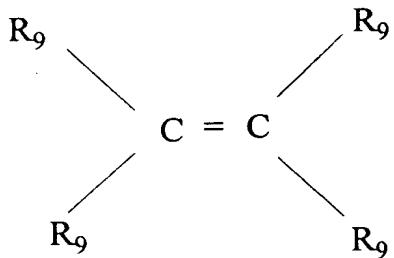
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10



and/or an internal olefin shown by formula X,



15



where R_9 is the same or different and as hereinabove defined.

27. An agricultural formulation according to claim 18 wherein the copolymer contains
20 additional comonomer residues which will not substantially change the character of the
copolymers.

28. An agricultural formulation according to claim 18 wherein the dispersant is readily

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soluble in water.

29. An agricultural formulation according to claim 18 wherein the dispersant is an agriculturally acceptable salt of the copolymer and wherein the salt comprises sodium, 5 potassium and/or ammonium ions.

30. An agricultural formulation according to claim 18 wherein the copolymer is polyanionic.

10 31. An agricultural formulation according to claim 18 wherein the copolymer is in the form of its free acid.

32. An agricultural formulation according to claim 18 wherein the dispersant is a water-soluble agriculturally acceptable derivative of the copolymer wherein said derivative is 15 selected from the group consisting of polyalkyleneoxy derivatives, polyethyleneglycol derivatives, polyamide derivatives and polyvinyl alcohol derivatives.

33. An agricultural formulation according to claim 18 wherein copolymers are in the range of from 1000 to 90000 daltons.

20

34. An agricultural formulation according to claim 18 wherein the water-insoluble materials are selected from the group consisting of herbicides, insecticides, fungicides, biocides, molluscicides, algaicides, plant growth regulators, anthelmintics, rodenticides, nematocides, acaricides, amoebicides, protozoacides, fertilizers, crop safeners, fillers and 25 carriers and other adjuvants.

35. An agricultural formulation according to claim 18 wherein the formulation further comprises a surfactant wetting agent.

30 36. An agricultural formulation according to claim 35 wherein the surfactant wetting

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agent is selected from the group consisting of an alkylpolysaccharide; di or mono alkyl sulphosuccinate derivative; a nonionic surfactant loaded onto an inert silicate carrier; and a non-ionic surfactant delivered in the form of a urea surfactant complex.

5 37. A method of making an agrochemical formulation comprising the steps of:

- (i) combining at least one insoluble material, and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents.

20

38. A method according to claim 37 comprising the steps of:

- (i) combining at least one insoluble material, and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents

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and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents;

5

- (ii) milling said combination to a particle size range in order to obtain a stable, readily-suspendible aqueous dispersion; and
- 10 (iii) stabilising said aqueous dispersion to obtain an SC formulation suitable for dilution in water for agricultural use.

38. A method according to claim 37 comprising the steps of:

- 15 (i) combining at least one insoluble material, with at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents; and
- 20
- 25
- (ii) milling said combination to a desired particle size to obtain a homogeneous wettable powder (WP) formulation.
- 30

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39. A method according to claim 37 comprising the steps of:

- (i) combining at least one insoluble material suitable for agricultural use with at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted,
5 wherein the substituents for said first comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said
10 optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents;
15 and
- (ii) blending said combination to obtain a homogeneous wettable powder (WP)
20 formulation.

40. A method according to claim 37 comprising the steps of:

- (i) combining at least one insoluble material suitable for agricultural use with at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted,
25 wherein the substituents for said first comonomer are selected from the group

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consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and 5 optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents;

(ii) agglomerating said combination to form discrete granular materials; and

10 (iii) drying said granular materials to obtain a water dispersible granule WG formulation.

41. A method according to claim 37 wherein the first comonomers are selected from the group consisting of fumaric acid, maleic acid and anhydrides, and the esters, amides 15 and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids and the corresponding esters and amides derived from them, vinylphosphonic acid and the corresponding esters and amides derived from it and ethylene sulphonic acid and the esters and amides derived from it.

20

42. A method according to claim 37 wherein the second comonomer is selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane.

25 43. A method according to claim 37 wherein the second comonomer is selected from the group consisting of substituted and unsubstituted norbornene, cyclopentadiene and substituted cyclopentadienes, substituted and unsubstituted dicyclopentadienes , cyclohexenes, furans and indenes.

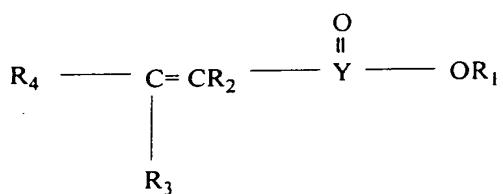
30 44. A method according to claim 37 wherein the second comonomer is selected from

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the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl pyrans and vinyl pyrrolidones.

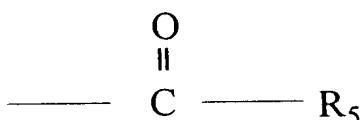
5 45. A method according to claim 37 wherein the second comonomer is an α -olefin having an alkyl group selected from the group consisting of diisobutylene, isobutylene, n-octene, n-decene, allylglycidylether or vinylisobutylether.

46. A method according to claim 37 wherein the first comonomer has a structure I
10



II

wherein R_1 is a metal, quaternary ammonium, phosphonium or sulphonium residue, R_2 is hydrogen or C_1 to C_4 alkyl, Y is a carbon atom, $\text{O}=\text{S}$, or POR where R is a hydrogen 15 atom or alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R_4 is H, an alkyl radical or a carboxylic acid derivative of form II



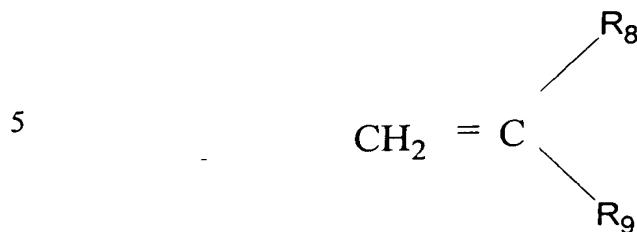
III

20 wherein R_5 is OR_6 , NR_6R_7 , SR_6 ,

- 62 -

wherein R₆ and R₇ are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent.

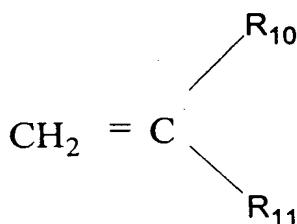
47. A method according to claim 37 wherein the second comonomer has a structure III



III

wherein R₈ represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R₉ represents hydrogen, a branched chain alkyl radical of from 1-12 carbon atoms, or a cycloalkyl radical,

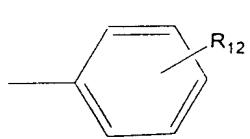
10 and/or a vinyl compound of formula IV



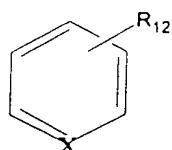
IV

wherein R₁₀ is a straight or branched chain alkyl radical of from 1-4 carbons and R₁₁ is
15 given by formula V, VI or VII,

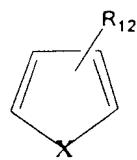
- 63 -



V

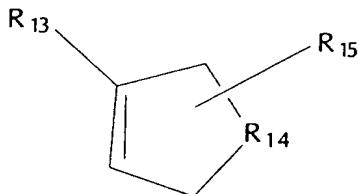


VI



VII

wherein R_{12} represents one or more alkyl radicals or one or more of H, Cl, OR and SO_3R_1
 5 NO_2 , PO_3R_1 and X is a hetero atom other than carbon; and/or an olefin shown by formula
 VIII,

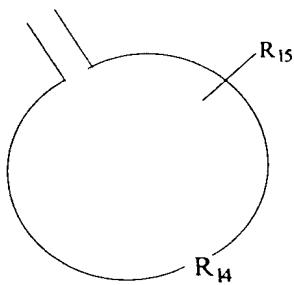


VIII

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wherein R_{13} is Cl, SO_3R_1 , alkyl, O-alkyl or O-aryl, and R_{14} represents from 4-20 carbon atoms such as to make a cyclic or polycyclic alkane or polyalkenyl compound, R_{15} is an epoxide or SO_3R_1 reacted with an unsaturated portion of the ring comprising R_{14} ;

15 and/or an exocyclic olefin shown by formula IX

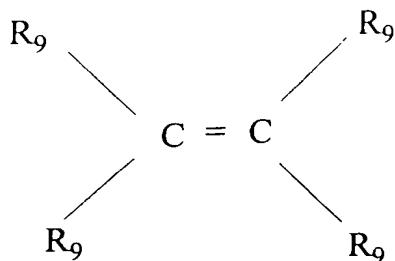


IX

and/or an internal olefin shown by formula X,

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- 64 -



X

where R₉ is the same or different and as hereinabove defined.

5

48. A method according to claim 37 wherein the copolymer contains additional comonomer residues which will not substantially change the character of the polymer.

49. A method according to claim 37 wherein the dispersant is readily soluble in water.

10

50. A method according to claim 37 wherein the dispersant is an agriculturally acceptable salt of the copolymer and wherein the salt comprises sodium, potassium and/or ammonium ions.

15 51. A method according to claim 37 wherein the copolymer is polyanionic.

52. A method according to claim 37 wherein the copolymer is in the form of its free acid.

53. A method according to claim 37 wherein the dispersant is a water-soluble agriculturally acceptable derivative of the copolymer wherein said derivative is selected from the group consisting of polyalkyleneoxy derivatives, polyethyleneglycol derivatives, polyamide derivatives and polyvinyl alcohol derivatives.

54. A method according to claim 37 wherein copolymers are in the range of from 1000

- 65 -

to 90000 daltons.

55. A method according to claim 37 wherein the water-insoluble materials are selected from the group consisting of herbicides, insecticides, fungicides, biocides, molluscicides, 5 algaicides, plant growth regulators, anthelmintics, rodenticides, nematocides, acaricides, amoebicides, protozoacides, fertilizers, crop safeners, fillers and carriers and other adjuvants.

56. An agricultural formulation produced by the method of any one of claims 37 to 40.

10

57. A method of treatment of a substrate with an active water-insoluble agrochemical principal comprising the following steps:

(i) preparing a formulation comprising at least one active water-insoluble 15 agrochemical principal and at least one dispersant comprising a copolymer wherein said copolymer comprises a residue of a first comonomer and a residue of a second comonomer, wherein said first comonomer is an α,β -unsaturated oxyacid or anhydride and said second comonomer is an olefin having at least one polymerizable double bond and wherein at least one of said first comonomer and said second comonomer is substituted, wherein the substituents for said first 20 comonomer are selected from the group consisting of esters, amides, thioesters and functional groups derived from reaction with nucleophilic reagents and wherein the substituents for the second comonomer are selected from the group consisting of epoxides; sulfonates; esters; amides; and optionally substituted pendent aromatic and heteroaromatic groups wherein said optional substituents are selected from the 25 group consisting of sulfonates, nitrates, phosphates and other substituents derived from reaction with electrophilic reagents;

(ii) dispersing said formulation in an aqueous medium; and

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- 66 -

(iii) applying the dispersed formulation to a substrate.

58. A method according to claim 57 wherein the first comonomers are selected from the group consisting of fumaric acid, maleic acid and anhydrides, and the esters, amides and imides derived from them, itaconic acid and anhydride and the corresponding esters amides and imides derived from them, acrylic and methacrylic acids, esters and amides, vinylphosphonic acid and the corresponding esters and amides derived from it and ethylene sulphonic acid and the esters and amides derived from it.

10 59. A method according to claim 57 wherein the second comonomer is selected from the group consisting of β -pinene, 5-ethylidene-2-norbornene, methylene cyclohexane and methylene cyclopentane.

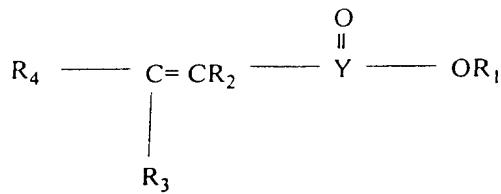
15 60. A method according to claim 57 wherein the second comonomer is selected from the group consisting of substituted and unsubstituted norbornene, cyclopentadiene and substituted cyclopentadienes, substituted and unsubstituted dicyclopentadienes , cyclohexenes, furans and indenes.

61. A method according to claim 57 wherein the second comonomer is selected from the group consisting of limonene and similar terpenes, vinyl cyclohexanes, vinyl cyclohexenes, vinyl pyridines, vinyl thiophenes, vinyl naphthalenes, vinyl furans, vinyl pyrans and, vinyl pyrrolidones.

20 62. A method according to claim 57 wherein the second comonomer is an α -olefin having an alkyl group selected from the group consisting of diisobutylene, isobutylene, n-octene, n-decene, allylglycidylether or vinylisobutylether.

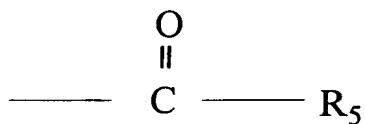
63. A method according to claim 57 wherein the first comonomer has a structure I

- 67 -



I

wherein R_1 is a metal, quaternary ammonium, phosphonium or sulphonium residue, R_2 is hydrogen or C_1 to C_4 alkyl, Y is a carbon atom, $\text{O}=\text{S}$, or POR where R is a hydrogen atom or alkyl radical having from 1 to 10 carbon atoms (or carboxylated such radical) and R_4 is H, an alkyl radical or a carboxylic acid derivative of formula II



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II

wherein R_5 is OR_6 , NR_6R_7 , SR_6 ,

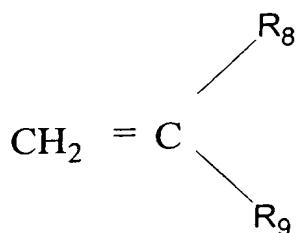
wherein R_6 and R_7 are H, alkyl, O-alkyl, or alkyl groups with a hetero atom substituent.

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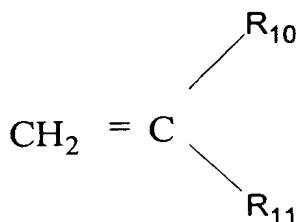
- 68 -

64. A method according to claim 57 wherein the second comonomer has a structure III



5 wherein R_8 represents hydrogen, a straight or branched chain alkyl of from 1-4 carbon atoms, R_9 represents hydrogen, a branched chain alkyl radical of from 1-12 carbon atoms, or a cycloalkyl radical,

and/or a vinyl compound of formula IV

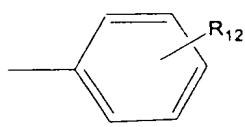


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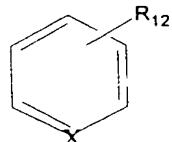
IV

wherein R_{10} is a straight or branched chain alkyl radical of from 1-4 carbons and R_{11} is given by formula V, VI or VII,

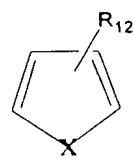
15



V

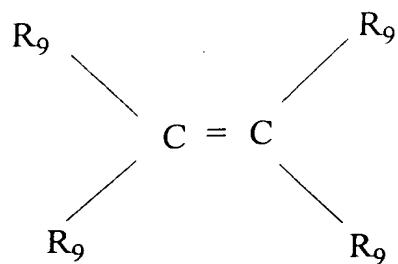


VI



VII

- 70 -



X

where R₉ is the same or different and as hereinabove defined.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 98/00855

A. CLASSIFICATION OF SUBJECT MATTER		
Int Cl ⁶ : A01N 25/30; B01F 17/52		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC: A01N 25/30; B01F 17/52		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT: copolymer: or polymer: or resin:		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 57541/86 A (ATLANTIC RICHFIELD COMPANY) 8 January 1987 whole document, particularly page 5 line 24	1,2,5,8
X	EP 592169 A (ROHM AND HAAS COMPANY) 13 April 1994 whole document, particularly page 2 line 45	1,2,5,8
X	EP 608845 A (NATIONAL STARCH AND CHEMICAL INVESTMENT HOLDING CORPORATION) 3 August 1994 whole document, particularly page 4 line 49	1,2,5,8
X	EP 364922 A (MITSUBISHI PAPER MILLS, LTD) 25 April 1990 whole document	1,2,6,8,65,66,70,72
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C		<input checked="" type="checkbox"/> See patent family annex
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention		
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone		
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art		
"&" document member of the same patent family		
Date of the actual completion of the international search 26 November 1998		Date of mailing of the international search report 10 DEC 1998
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (02) 6285 3929		Authorized officer GAYE HOROBIN Telephone No.: (02) 6283 2069

INTERNATIONAL SEARCH REPORT

International application No. PCT/AU 98/00855

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 80944/87 A (NIPPON SHOKUBAI KAGAKU KOGYO CO, LTD) 12 May 1988 whole document, particularly page 8 line 28	1,2,6,8,65,66,70,72
X	DE 19641297 A (ROHN AND HAAS CO) 10 April 1997 whole document, particularly column 3 line 50	1,2,4,8,65,66,68,72
X	EP 402563 A (SIKA AG) 19 December 1990 whole document, particularly page 2 lines 50-55	1,2,5,8
X	WO 96/00251 A (THE DOW CHEMICAL COMPANY) 4 January 1996 whole document	1,2,9,10,11,12,19,20,21, 22,25,26,27,28,30,3 5,42,43,44,48- 50,51,65,66,73-76,79- 82
X	EP 357149 A (THE DOW CHEMICAL COMPANY) 1 September 1988 whole document	1,2,9-12,19-22,25- 28,30,35,42-44,48- 51,65,66,73-76,79-82
X	WO 96/37101 A (KEMIRA AGRO OY) 28 November 1996 whole document	1,2,9-12,19-22,25- 28,30,35,42-44,48- 51,65,66,73-76,79-82
X	Patent Abstracts of Japan, C-192, page 95, JP 58-131903 A (DAIICHI KOGYO SEIYAKU KK) 6 August 1983 Abstract	1,2,6,9-12,19-22,25- 28,30,35,42-44,48- 51,65,66,73-76,79-82
X	Derwent Abstract Accession No: 55707E/27, Class A60, E12, G02 (G03), JP 57084730 A (NIPPON OILS AND FATS KK) 27 February 1982 Abstract	1,2,6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 98/00855

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
2. Claims Nos.: 7, 17, 40, 71 because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
In Formula I "R₃" has not been defined, nor has it been defined in the corresponding sections of the description. These claims are thus too imprecise for any meaningful search to be carried out.
3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU 98/00855

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
✓AU	57541/86	US	4698161	JP	62001746		
✓EP	592169	AU	48785/93	CA	2107410	CN	1086233
		JP	6115930	NZ	248855		
✓EP	608845	AU	53978/94	AU	52336/96	CA	2119998
		EP	869169	EP	875553	EP	878446
		EP	879793	JP	6315622	JP	9052040
✓EP	364922	AU	42886/89	US 5068067		JP	2187387
		JP	2111428	JP	2303532	JP	2303533
✓AU	80944/87	CA	1312987	US 4818783		US	4892902
		JP	1028215	JP	63233013	JP	63233012
		JP	63233014	JP	63248718	JP	63233011
✓DE	19641297	CA	2186831				
✓EP	402563	AU	55142/90	BR	9002288	CA	2016824
		JP	3035007	NO	901800	NZ	233048
		PT	94059	US 5100984			
✓WO	96/00251	AU	73571/94	CN	1159199	EP	766705
		US 5693716		US 5753766		AU	64854/94
		CA	2127199	CZ	9401613	EP	631786
		HR	940381	HU	67225	JP	7145076
		NO	942367	PL	304061	SK	798/94
		ZA	9404522	US 5597800		US	5520912
Continued							

Patent Document Cited in Search Report				Patent Family Member			
EP	357149	AU	40827/89	BR	8904400	DK	4324/89
		FI	894089	JP	2167201	US	5508035
WO	96/37101	AU	56954/96				

END OF ANNEX